Remarks

In the Office Action dated 9/13/2005 which was made **FINAL** ("Final Rejection"), Claims 5-10 and 12-26 were rejected. In the amendment set forth above, Claims 5, 8, and 18 are amended, and the remaining Claims are unchanged. It is respectfully requested that this amendment be entered. In view of these amendments to the Claims, and the arguments set forth below, it is respectfully submitted that Claims 5-10 and 12-26 are in condition for allowance.

1. Claims 5-10 and 18 were rejected under 35 USC §112 second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. In particular:

A. In reference to Claim 5, it was said that the phrase "a transfer program for transferring control of said next available IP resource from said second stage lottery program..." was not clearly understood. This phrase has been replaced with " a transfer program for assigning said next available IP resource to execute a task assigned to said selected one of said at least two levels..." This language thereby clarifies that the transfer program is causing the IP resource to execute a task that is assigned to the selected level. This corresponds to the description in Applicants' Specification. (Applicants' Specification page 12 lines 12-14.) With this change, it is believed that Claim 5 satisfies the requirements of 35 USC §112, and this rejection should be withdrawn. The object to dependent Claims 6-7 and 9-10 that depend from Claim 5 should likewise be withdrawn.

B. In reference to Claim 8, it was said that the phrase "each level of said at least two levels will only have tasks of like quantum values within said each level" is not clearly understood. This phrase has been replaced with "wherein tasks within each level of said at least two levels will be assigned to

said next available IP resource for a same amount of time as other tasks in said level". This makes clear that according to this embodiment of the invention, each task in the level is assigned an available IP resource for the same amount of time (i.e., for the same number of quantums.) With this change, it is believed that Claim 8 satisfies the requirements of 35 USC §112, and this rejection should be withdrawn.

C. In reference to Claim 18, it was said that the phrase "a transfer program for transferring control from said second stage lottery program to a task found" is not clear. This phrase has been changed to "a transfer program for causing said IP resource to begin execution of a task assigned to said selected one of said at least two levels". This clarifies the purpose of the transfer program. This is similar to the amendment set forth herein for Claim 5 above, and is in accordance with the description in the Specification. (See Applicants' Specification page 12 lines 12-14.) With this change, it is believed that Claim 18 satisfies the requirements of 35 USC §112, and this rejection should be withdrawn.

With the above-described amendments to the Claims, it is believed that all pending Claims now satisfy the requirements of 35 USC §112, second paragraph, and this rejection should be withdrawn.

2. Claims 5-10 and 12-26 were rejected under 35 USC §103(a) as being unpatentable over the paper entitled "Time-Function Scheduling: A General Approach to Controllable Resource Management" by Liana L. Fong et al. ("Fong") in view of U.S. Patent No. 5,569,084 to Nicastro et al. ("Nicastro"). This rejection is respectfully traversed.

Before addressing the specifics of the rejection in detail, a summary of Fong and Applicants' invention is provided for discussion purposes.

Applicants' system and method utilizes a ***two-stage lottery mechanism***.

According to one aspect of the mechanism, a first lottery (i.e., a first stage) is conducted to select a class of tasks. A second lottery (i.e., a second stage) may then be conducted to select one of multiple levels contained in this class. A pending task is then selected from this level. (Applicants' Specification page 8 line 24 through page 9 line 11.) This two-stage lottery can be completed very efficiently, and applies the benefits of the random selection process both to the class selection, and the level selection. Moreover, the use of multiple levels within the class makes the system flexible, and provides for a large number of scheduling options.

Turning next to Fong, this reference primarily describes a general approach to resource management called Time-Function Scheduling (TFS) that is largely beyond the scope of the current discussion. In addition to describing the TFS method of resource allocation, Fong compares the performance of the TFS approach with several lottery methods. In one version, the alternative lottery method is used to select a job class only. Then a first-come-first-service (FCFS) algorithm is used to select the job, as follows:

> "Our prototype therefore implements a slightly modied (sic) version of lottery scheduling in which tickets are assigned to job classes instead of individual jobs. **The resource is then granted to the job at the head of the run-queue associated with the class holding the winning ticket. An FCFS ordering is maintained at each run-queue.**" (Fong page 13 section 3.2, lines 6-9, emphasis added.)

Thus, the Fong prototype implements a ***one-stage lottery mechanism*** that selects a class via a lottery, and then selects the job at the head of the run queue for the selected class.

Fong also mentions an alternative that uses a TFS mechanism to control resource allocation across classes, while using a lottery scheme to determine which task within the class will be executed. (Fong, sentence bridging pages 21 and 22.)

In regards to both of the alternative one-stage lottery mechanism described in Fong, Fong specifically states that TFS achieves the same execution rate goals "***while significantly reducing the waiting time variance, in some cases by as much as several orders of magnitude***." (Fong page 5, second sentence of first full paragraph.) Thus Fong ***generally teaches away from using even a one-stage*** lottery mechanism.

To summarize the foregoing:

a.) Fong discusses several implementations, both using a ***single-stage lottery*** (See Fong page 13 lines 28-29 and page 21 last sentence.)

b.) Nothing in Fong teaches selection of a class **followed by selection of a level within a class** culminating in selection of a task within a level.

c.) The single stage lottery approach is described by Fong as being inferior to the TFS mechanism. Thus, Fong actually **teaches away from using even the one-stage lottery approach**. Therefore, Fong most certainly teaches away from any sort of system that would add yet another lottery stage to the task selection process.

With the foregoing summary available for discussion purposes, the specific Claim language is next discussed.

Independent Claim 5, as currently amended, includes a random number generator and selection program for generating a ***first random number*** for selecting from among at least two classes. This random number generator and program further generate a ***second random number*** for selecting from at least two levels within the selected class. A task associated with the selected level is then assigned to the next available IP resource. This ***two-stage lottery process,*** which includes generating a first random number to select a class, and a second random number to select a level, is not taught or suggested by Fong.

As discussed above,

a.) Fong discusses only a ***single lottery stage*** for ***selecting a class.***

b.) After the Fong class is selected, the resource to be allocated is "...granted to the job at the head of the run-queue associated with the class holding the winning ticket. An FCFS ordering is maintained at each run-queue." (Fong page 13 lines 30-31.) Thus, Fong uses the FCFS method to select the task from the selected class. ***Fong does not teach use of a second lottery stage, and does not teach select of a level within a class.***

Next, the Examiner's comments regarding Fong are considered. The Examiner states that Fong teaches the invention of Claim 5 substantially as claimed, including the second stage lottery program, as well as classes that each includes at least two levels of tasks. In support of this assertion, page 14 lines 1-20, page 21 line 28 - page 22 line 1 of Fong is cited. (See Final Rejection page 3, last line.) Nothing in this cited material describes using a lottery mechanism during two different stages. Moreover, nothing in these passages discusses use of levels within a class, then selection of a task from a level. If this rejection is maintained, further clarification is requested concerning the perceived relevance of these passages of Fong.

Next, the Examiner states that Fong does not explicitly teach Applicants' random number generation and selection program, but Nicastro does.

Nicastro teaches a method of controlling the odds for any given symbol set (e.g., three bars) of a reel-type slot machine. According to this method, all of the possible reel stop combinations are assigned to unique terminal nodes in one or more fractional branching trees. A random number generator is used to select entries on each tier until a terminal node is encountered that is associated with the selected reel stop combination.

To summarize, Nicastro describes a method to obtain an outcome for a spin of a lottery wheel, and is not associated with a dispatcher program as discussed by Fong. The Examiner states that it would be obvious for one skilled

in the art to combine Fong with Nicastro because the random number generator for selecting between at least two levels would improve the efficiency of Fong.

As discussed above, Fong ***specifically describes how use of single stage lottery mechanism to select a job increases possible wait time (i.e., variance)*** for processing the jobs within a class as follows:

> "Our experimental results demonstrate that TFS achieves the same proportional execution rate goals [as lottery scheduling] ***while significantly reducing the waiting time variance, in some cases by as much as several orders of magnitude***." (Fong page 5, second sentence of first full paragraph, in reference to a discussion of lottery scheduling that immediately precedes this passage.)

This is reiterated as follows:

> "In particular, we show that TFS can achieve the same relative execution rates of lottery scheduling while significantly reducing the variability in response. Moreover, TFS provides very fast and stable convergence to these resource allocation goals." (Fong page 13 lines 2-3.)

These passages state that the alternative TFS mechanism taught by Fong results in significant reduction in variance (i.e., the difference between wait times for jobs in a single class) as compared to use of the corresponding lottery scheduling policy for selecting a job. ***Fong therefore explicitly states that the alternative TFS mechanism being taught by Fong provides an improvement over an approach that uses even a single stage lottery.*** Given this specific teaching, it is not understood how one skilled in the art would be at all encouraged by Fong to incorporate even one lottery stage into a dispatch system much less two stages, as the Examiner so states. For at least these reasons, the rejection of Claim 5 is improper, and should be withdrawn.

Claims 6 - 10 depend either directly or indirectly from Claim 5 and are allowable for all of the reasons discussed above in regards to Claim 5. These Claims are further allowable because they describe additional aspects not taught or suggested by the cited combination of references.

Next, independent Claim 12 is considered. This Claim includes aspects that are similar to those discussed above in regards to Claim 5. In particular, this Claim describes a two stage lottery execution process that uses a first lottery process for determining a class, and a second process to select an assigned task. As previously discussed, Fong does not teach or suggest a two-stage lottery process, and, in fact, teaches away from such a process in several different ways. Nicastro has nothing to do with a dispatcher. Moreover, Fong specifically teaches away from adding anything taught by Nicastro into a dispatching program. Therefore, for reasons similar to those discussed above in regards to Claim 5, Claim 12 is allowable over this rejection.

Claims 13 – 18 depend from Claim 12 and are allowable over this rejection for reasons similar to those discussed in reference to Claims 5 and 12. These Claims include additional aspects not taught or suggested by Fong, and are therefore allowable over this rejection for these additional reasons.

Independent Claim 19 describes a method that include running a first stage of a lottery algorithm to select a class, and running a second stage to select a priority level from this class from which to select a task. Independent Claim 20 includes aspects similar to those described in Claim 19. For reasons similar to those discussed above in regards to Claim 5, Claims 19 and 20 are allowable over this rejection, which is improper, and should be withdrawn.

Claims 21- 25 depend from Claim 20 and are allowable over this rejection for reasons similar to those discussed above in regards to the independent Claims. These Claims include additional aspects of the invention not taught by the cited reference, and are therefore allowable because of these additional aspects.

Independent Claim 26 describes a two-stage lottery process, and is allowable over this rejection for reasons similar to those discussed in regards to Claim 5 above.

To summarize, Fong does not in any way teach or suggest Applicants' two-stage lottery mechanism described in each of the independent Claims. In fact, Fong actually teaches away from even a one-stage lottery approach, and most definitely teaches away from any approach that would add multiple lottery stages to the selection process. Although Nicastro is cited as teaching the two-stage process, one skilled in the art would not be motivated to combine aspects of any two-stage lottery mechanism into Fong in view of the specific teachings of Fong. For at least the foregoing reasons, the current rejection is improper, and a Notice of Allowance is respectfully requested.

Conclusion

In the Office Action dated 9/13/2005 which was made **FINAL** ("Final Rejection"), Claims 5-10 and 12-26 were rejected. In the amendment set forth above, Claims 5, 8, and 18 are amended, and the remaining Claims are unchanged. It is respectfully requested that this amendment be entered. In view of these amendments to the Claims, and the arguments set forth below, it is respectfully submitted that Claims 5-10 and 12-26 are in condition for allowance, and an early Notice of Allowance is respectfully requested. If the Examiner has any questions or concerns regarding this response, a call to the undersigned is appreciated and welcomed.

Respectfully submitted,

Beth L. McMahon 11/14/2005

Beth L. McMahon
Attorney for Applicants
Reg. No. 41,987
Telephone No. 651-635-7893

Unisys Corporation
M.S. 4773
P.O. Box 64942
St. Paul, MN 55164-0942